Space Weather Forecast

Issued on Sunday, 18 September 2022 at 01:17 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Minor Geomagnetic Storm possible into new UTC working week. Chances of Minor Radio Blackouts and Solar Radiation Storms reducing.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity was moderate over the past 24 hours, with two Moderate-class flares recorded from over the northwestern solar horizon. The first of these occurred at 17/1339UTC, with the source appeared to be near the recently departed most active sunspot of the past week's expected position, with resulting ejecta seen leaving the Sun above the plane of the Earth's orbit into the UTC evening. The second event was observed at 17/2041UTC, perhaps from the sunspot group itself. At the time of writing, no Coronal Mass Ejection (CME) appeared to have been produced from this event, and no additional solar radiation enhancement was observed.

There are currently three sunspot regions on the Sun. The largest and nominally most complex of these remained in the southeast and saw some growth in its trailing spot. To its west, the smallest group faded a little, while the third of the trio saw its trailers also fade. X-ray activity from all of these regions failed to range beyond low common-class.

Satellite imagery for the 24 hours showed a slow high latitude release. This ejecta is considered front-sided, but could not be tied to any obvious event, and in any case is considered to lie entirely above the plane of the Earth's orbit to no effect. Also observed were faint emissions heading both east and southwest, but perhaps most notably the CME tied to the first moderate-class flare was seen heading northwest. This final feature has yet to be analysed, but is also unlikely to have any Earth-based effects from this location.

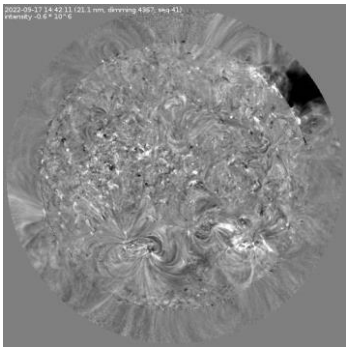

Figure 1: Time-integrated extreme UV imagery courtesy of SIDC ROB of the 'coronal dimming' (with larger events often a signature of CMEs) tied to the moderate class X-ray flare 17/1339UTC. This event has yet to be modelled, but Earth-based effects are considered unlikely.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

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Solar Wind / Geomagnetic Activity: The solar wind followed a slow regime, but with a notable associated rising magnetic field: from background to slightly elevated levels. The north-south component was small-scale and changeable initially, but became larger in magnitude, with more lasting forays into both co- and anti-aligned territory (with Earth's field) with time.

The remainder of solar wind measures were more typical, with the solar wind speed showing an erratic rise but remaining within background, while the number of particles comprising the wind was unremarkable and steady.

The net result of the above solar wind measures was provisionally quiet throughout.

Energetic Particles / Solar Radiation: Solar radiation remained slightly elevated above background levels over the 24 hours, but less than 2.5pfu and on a flat trend, where 10pfu is the requisite threshold for S1 for 10MeV protons.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to fall with the passing of the most complex sunspot group into the current weekend, although for day one it probably remains near enough the front side to throw X-ray producing ejecta clear of the horizon (as seen on Saturday) to give a peak chance of moderate-class X-ray flares for the four days, the risk otherwise being slight.

Solar Wind / Geomagnetic Activity: There is one unified CME that features in the current forecast - the product of two 'filament eruptions' (arcs of plasma ejected from the Sun) starting 15/2100UTC and 16/0100UTC from the southwest. These may give a glancing blow late in the UTC of Sunday 18 September, and a corresponding Slight Chance of Minor Geomagnetic Storm G1.

A 'coronal hole' fast wind is overdue but may now show possible concurrent arrival with the above CME later on day one, Sunday 18 September.

Initially quiet conditions may rise to a slight chance of G1 late Sunday 18 and through Monday 19 September, returning to quiet from Tuesday.

Energetic Particles / Solar Radiation: The chances of S1+ level solar radiation storms are slightly elevated given the already enhanced environment surrounding Earth, although the trend is downwards as the most liable sunspot group to produce such events rotates away from a favourable position in the period.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	20	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	30	20	20	20
Very Active	R3 to R5 X	No	5	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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